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## A Bibliography of Anomalies of Fishes

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# **Gulf Research Reports**

## **Volume 1, Number 6**

**Ocean Springs, Mississippi, U.S.A.**

**April, 1964**

A BIBLIOGRAPHY OF ANOMALIES  
OF  
FISHES

By

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## Introduction

This bibliography was originally intended as an adjunct to the author's current studies of anomalies in marine fish populations. A number of recent notes have shown, however, that present workers are largely unfamiliar with the rather extensive literature on fish teratology in respect to both particular anomalies and their previous recognition in a species or other taxon. There is an evident need for a compilation of the literature and it is hoped that the present work will fulfill its purpose by facilitating current and future studies in this important area of ichthyology.

Standard bibliographical and abstracting sources such as Dean's "Bibliography of Fishes," "Zoological Record," "Biological Abstracts" and the "Current Bibliography for Aquatic Sciences and Fisheries" have all been searched for applicable citations. Further entries have been obtained from Gemmill's "Teratology of Fishes" and other references available to the writer. It is unfortunate that the included references have not all been read and abstracted but this was beyond the scope of available time and finances.

In general, the bibliography is restricted to naturally occurring anomalies and literature on the experimental production of abnormalities has been omitted. The few exceptions, particularly in the areas of wounds and regeneration, are included because of their obvious application to survival studies on free-living fishes. All citations are given equal status in that no attempt has been made to indicate relative importance of individual contributions. It is doubtful whether any bibliography may be considered complete but it is felt that literature dealing directly with abnormalities has been fairly well covered. The major omissions may be expected in papers of Russian, Baltic and Scandinavian origin as well as in references to teratological material included in studies of a more general nature, and not listed in the titles. In this respect, it is requested that errors of omission and commission be brought to the writer's attention. Authors of pertinent subject material are requested to forward reprints so that a continuing file on anomalous fishes may be maintained at this Laboratory.

Abbreviations and complete titles of literature sources have largely been compiled from the "World List of Scientific Periodicals" and the "World List of Periodicals for Aquatic Sciences and Fisheries." The full title or place of publication have not been obtained for a few journals and these are identified only by the information available to the writer.

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## Index of Sources and Abbreviations


Abh. naturh. Ges. Nürnberg.....	Abhandlungen der Naturhistorischen. Gesellschaft zu Nürnberg.
Acta Soc. Fauna Flora fenn. ....	Acta Societatis pro Fauna et Flora Fennica, Helsinki.
Acta Soc. Linn., Bordeaux.....	Actes, Société Linnéenne de Bordeaux, Bordeaux.
Acta zool. sin. ....	Acta Zoologica Sinica. Peking.
Akvarist. Listy .....	Akvaristické Listy. Praha.
Allatt Kozlem. ....	Alattani Kozlemenyekek Budapest.
Allg. FischZtg. ....	Allgemeine Fischereizeitung. München.
Amer. J. Anat. ....	American Journal of Anatomy. Baltimore.
Amer. J. Sci. ....	American Journal of Science. New Haven.
Amer. Mus. Novit. ....	American Museum Novitates. New York.
Amer. Nat. ....	American Naturalist. Tempe, Ariz.
Anal. Inst. Cerc. pisc. Român. ....	Analele Institutului de cercetări Piscicole al României. Bucharest.
Anat. Anz. ....	Anatomischer Anzeiger. Jena.
Anat. Rec. ....	Anatomical Record. Philadelphia.
Anim. Kingd. ....	Animal Kingdom. New York.
Ann. Hist. nat.....	Annales d'histoire naturelle. Paris.
Ann. Mag. nat. Hist.....	Annals and Magazine of Natural History. London.
Ann. Paléont. ....	Annales de paléontologie. Paris.
Ann. Rep. Fish. Bd. Scot.....	Annual Report of the Fishery Board for Scotland. Edinburgh.

Ann. S. Afr. Mus.....	Annals of the South African Museum. Cape Town.
Ann. Sci. nat.....	Annales des Sciences Naturelles. Paris.
Ann. Scot. nat. Hist.....	Annals of Scottish Natural History. Edinburgh.
Annot. zool. jap.....	Annotationes Zoologicas Japonenses. Tokyo.
Annu. Mus. zool. Acad. St-Pétersb...	Annales du Musée zoologique. Acad. imp. des sciences. St-Petersbourg.
Annu. Rep. Smithson. Instn.....	Annual Report, Smithsonian Institution. Washington, D. C.
Annu. Soc. paléont. russe.....	Annuaire de la Société paléontologique de Russie.
Aquar., Berlin .....	Aquarium, Berlin.
Aquar.-u. Terrar. Z.....	Aquarien-und Terrarien-Zeitschrift. Stuttgart.
Aquarium J. ....	Aquarium Journal. San Francisco.
Aquarium, Philad. ....	Aquarium. Philadelphia.
Arb. anat. Inst., Wiesbaden.....	Arbeiten aus anatomischen Instituten. Wiesbaden.
Arb. ung. biol. ForschInst.....	Arbeiten des Ungarischen biologischen Forschungs-Institutes. Tihany.
Arb. zool. Inst. Univ. Wien.....	Arbeiten aus den Zoologischen Instituten der Univ. Wien.
Arch. Anat. Physiol., Lpz.....	Archiv für Anatomie u. Physiologie. Leipzig.
Arch. Biol., Paris.....	Archives de biologie. Paris.
Arch. EntwMech. Org.....	Archiv für Entwicklungsmechanik der Organismen. Leipzig.
Arch. ges. Physiol.....	Archiv. für die Gesamte Physiologie. Leipzig.
Arch. Hydrob. Rybact.....	Archiwum hydrobiologii i rybactwa. Suwalki. (Arch. Hydrobiol. Ichthyol.).

Arch. Hydrobiol. ....	Archiv für Hydrobiologie. Stuttgart.
Arch. Mus. Hist. nat. Lyon.....	Archives du Muséum d'histoire naturelle de Lyon. Lyon.
Arch. Mus. Hist. nat. Paris.....	Archives du Muséum d'histoire naturelle. Paris.
Arch. Naturgesch. ....	Archiv für Naturgeschichte. Berlin.
Arch. Sci. phys. nat.....	Archives des sciences physiques et naturelles. Geneve.
Arch. Soc. biol. Montevideo.....	Archivos de la Sociedad de bio- logia de Montevideo.
Arch. Soc. zool.-bot. fenn. Vanamo. .	Archivum Societatis Zoologicae- Botanicae Fennicae 'Vanamo.' Helsinki.
Arch. Ver. Naturg. Mecklenb.....	Archiv des Vereins der Freunde der Naturgeschichte in Mecklen- burg. Güstrow.
Arch. zool. ital.....	Archivio Zoologico Italiano. Torino.
Atti Congr. Nat. ital.....	Atti del Congresso dei naturalisti italiani. Milano.
Atti Ist. veneto.....	Atti dell'Istituto Veneto di Scien- ze, Lettere ed Arti. Venezia.
Atti Mus. Stor. nat. Trieste.....	Atti del Museo Civico di Storia Naturale di Trieste. Trieste.
Atti Soc. ital Sci. nat.....	Atti della Società italiana di scienze naturali e del Museo civile de storia naturale. Milan.
Atti Soc. ligust. Sci. nat. geor.....	Atti della Società ligustica di scienze naturali e geografiche. Genova.
Aust. Mus. Mag.....	Australian Museum Magazine. Sydney.
Aust. Zool. ....	Australian Zoologist. Royal Zo- ological Society of New South Wales. Sydney.
Balkan-Kutat. Tud. Eredm.....	Balkan-Kutatásainak Tudomán- yos Eredményei. Budapest.



Beaufortia .....	Beaufortia (Zoological Museum). Amsterdam.
Berl. klin. Wschr. ....	Berliner klinische Wochenschrift. Berlin.
Bih. svensk. VetenskAkad. Handl. ....	Bihang till Kgl.Svenska Vetenskapsakademiens Handlingar. Stockholm.
Bijdr. Dierk. ....	Bijdragen tot der Dierkunde. Amsterdam.
Biol. Bull., Woods Hole .....	Biological Bulletin. Marine Biological Laboratory. Woods Hole.
Biol. Res. Fish. Exp. "ENDEAVOUR" .....	Biological Results of the Fishing Experiments carried out by F.I.S. "ENDEAVOUR, 1909-14. Melbourne.
Biol. Zbl. ....	Biologisches Zentralblatt. Leipzig.
Bl. Aquar.-u. Terrarienk. ....	Blätter für Aquarien-und Terrarienkunde. Stuttgart.
Bol. Inst. oceanogr., S. Paulo. ....	Boletim do Instituto Oceanográfico. São Paulo.
Bol. Pescas, Madr. ....	Boletín de pescas. (Instituto español de oceanografía). Madrid.
Bol. Soc. esp. Hist. Nat. ....	Boletín de la Sociedad Española de Historia Natural. Madrid.
Boll. Mus. Zool. comp., Genoa. ....	Bollettino dei Musei di Zoologia e di Anatomia Comparata della R. Università. Genoa.
Boll. Mus. Zool. Anat. comp., Torino. ....	Bollettino dei Musei di Zoologia e di Anatomia Comparata dell'Università. Torino.
Boll. Nat., Siena. ....	Bollettino del naturalista. Siena.
Boll. Pesca Piscic. Idrobiol. ....	Bollettino di Pesca, di Piscicoltura e di Idrobiologia. Roma.
Boll. Soc. lombarda Pesca. ....	Bollettino della Società lombarda per la pesca e l'Aquicoltura. Milan.
Boll. Soc. Nat. Napoli. ....	Bollettino della Società dei Naturalisti in Napoli. Naples.

Boll. Soc. zool. ital.....	Bollettino della Società zoologica italiana. Rome.
Bot. & Zool., Tokyo.....	Botany and Zoology, Theoretical and Applied. Tokyo.
Brit. med. J.....	British Medical Journal. London.
Bul. Inst. Cerc. pisc.....	Buletinul Institutului de Cercetări Piscicole. Bucharest.
Bul. Soc. Nat. Român.....	Buletinul Societății Naturalistilor din România. Bucharest.
Bull. Soc. roum. Sci.....	Buletinul Societății de Științe din București. Bucharest.
Bul. Soc. Ști. Cluj.....	Buletinul Societății de Științe din Cluj. Cluj.
Bull. Acad. Sci., Leningrad.....	Bulletin of the Academy of Sciences. Leningrad.
Bull. Acad. Sci., Petrograd.....	Bulletin of the Academy of Sciences. Petrograd.
Bull. Acad. Sci., St-Petersb.....	Bulletin of the Academy of Sciences. St-Petersburg.
Bull. Amer. Mus. nat. Hist.....	Bulletin of the American Museum of Natural History. New York.
Bull. biol. ....	Bulletin Biologique de la France et de la Belgique. Paris.
Bull. Brit. Mus. (nat. Hist. zool.)... 	Bulletin of the British Museum (Natural History zoology). London.
Bull. Fla. St. Mus. biol. Sci.....	Bulletin of the Florida State Museum. Biological Sciences. Gainesville.
Bull. Ill. nat. Hist. Surv.....	Bulletin of the Illinois Natural History Survey. Urbana.
Bull. Inst. océanogr. Monaco.....	Bulletin de l'Institut Océanographique. Monaco.
Bull. int. Acad. Prague.....	Bulletin international. (Académie des sciences de l'Empereur François Joseph I - Académie tchèque des sciences.) Prague.

- Bull. Japan Sea Fish. Res. Lab..... Bulletin of the Japan Sea Regional Fisheries Research Laboratory. Niigata.
- Bull. Jap. Soc. sci. Fish..... Bulletin of the Japanese Society of Scientific Fisheries. Tokyo.
- Bull. Mar. Sci. Gulf Caribb..... Bulletin of Marine Science of the Gulf and Caribbean. Coral Gables, Fla.
- Bull. Mus. Hist. nat., Paris..... Bulletin du Muséum National d'Histoire Naturelle. Paris.
- Bull. Mus. océanogr. Monaco..... Bulletin Musée Océanographique de Monaco. Monaco.
- Bull. N. C. geol. econ. Surv..... Bulletin of the North Carolina Geological and Economic Survey. Chapel Hill.
- Bull. N. Y. zool. Soc..... Bulletin of the New York Zoological Society. New York.
- Bull. Sci. Fr. Belg..... Bulletin Scientifique de la France et de la Belgique. Paris.
- Bull. Soc. Acclim., Biarritz..... Bulletin de la Société d'acclimatation du golfe de Gascogne. Biarritz.
- Bull. Soc. Aquic. Pêche..... Bulletin de la Société d'Aquiculture et de Pêche. Paris.
- Bull. Soc. cent. Aquic. Pêche..... Bulletin de la Société centrale d'Aquiculture et de Pêche. Paris.
- Bull. Soc. Hist. nat. Toulouse..... Bulletin de la Société d'Histoire Naturelle de Toulouse.
- Bull. Soc. linn. Normandie..... Bulletin de la Société linnéenne de Normandie. Caen.
- Bull. Soc. linn. Seine-Marit..... Bulletin de la Société linnéenne de la Seine-Maritime. Le Havre.
- Bull. Soc. Nat. Moscou..... Bulletin de la Société des naturalistes de Moscou.
- Bull. Soc. neuchâtel. Sci. nat..... Bulletin de la Société neuchâtoise des sciences naturelles. Neuchâtel.
- Bull. Soc. philom. Paris..... Bulletin de la Société Philomantique de Paris.

Bull. Soc. portug. Sci. nat.....	Bulletin de la Société portugaise des Sciences naturelles. Lisbonne.
Bull. Soc. Sci. Bretagne.....	Bulletin de la Société Scientifique de Bretagne. Rennes.
Bull. Soc. sci. méd. Ouest.....	Bulletin de la Société scientifique et médicale de l'Ouest. Rennes.
Bull. Soc. Sci. nat. Maroc.....	Bulletin de la Société des Sciences Naturelles et Physiques du Maroc. Rabat.
Bull. Soc. Sci. nat. Ouest.....	Bulletin de la Société des Sciences Naturelles de l'Ouest de la France. Nantes.
Bull. Soc. Sci. nat. Rouen.....	Bulletin de la Société des amis des Sciences Naturelles de Rouen. Rouen.
Bull. Soc. Sci. nat. Tunis.....	Bulletin de la Société des Sciences Naturelles de Tunisie. Tunis.
Bull. Soc. Sci. nat méd. Seine-et-Oise .....	Bulletin de la Société des Sciences Naturelles et Médicales de Seine-et-Oise. Versailles.
Bull. Soc. roy. Zool., Anvers.....	Bulletin de la Société Royale de Zoologie. Anvers.
Bull. Soc. vaud. Sci. nat.....	Bulletin de la Société vaudoise des sciences naturelles. Lausanne.
Bull. Soc. zool. Fr.....	Bulletin de la Société Zoologique de France. Paris.
Bull. Sta. biol. Arcachon.....	Bulletin de la station Biologique d'Arcachon. Bordeaux.
Bull. Sta. océanogr. Salambô.....	Bulletin. Station Océanographique de Salambô. Tunisia.
Bull. U.S. Fish. Comm.....	Bulletin of the United States Fish Commission. Washington.
Butll. Inst. catal. Hist. nat.....	Butlletí de la Institució catalana d'història natural. Barcelona.
Calif. Fish Game.....	California Fish and Game. Sacramento.

Canad. Fld. Nat.....	Canadian Field Naturalist. Ottawa.
Canad. J. Res.....	Canadian Journal of Research. Ottawa.
Canad. J. Zool.....	Canadian Journal of Zoology. Ottawa.
Ceylon J. Sci.(B).....	Ceylon Journal of Science (Bio- logical Sciences). Colombo.
Chesapeake Sci. ....	Chesapeake Science. Solomons, Md.
China J. ....	China Journal. Shanghai.
Chosen no Suisan.....	Chosen no Suisan, Pusan.
Circ. Coop. Invest. Fish. Japan Sea, Niigata.....	Nihon Kaiku Suisan Shiken Ken- kyu Renraku Nyusu, Niigata.
Collect. & Breed.....	Collecting and Breeding. Tokyo.
Contr. Canad. biol.....	Contributions to Canadian Biol- ogy. Ottawa.
Contr. Md. Dep. Res. Ed.....	Contribution Maryland Depart- ment of Research and Education. Solomons, Md.
Copeia .....	Copeia (The American Society of Ichthyologists and Herpetolo- gists). Philadelphia.
C. R. Acad. Sci., Paris.....	Compte Rendu Hebdomadaire des Séances de l'Académie des Sciences. Paris.
C. R. Ass. Anat.....	Compte Rendu de l'Association des anatomistes. Paris and Nancy.
C. R. Ass. avanc. Sci. Fr.....	Compte Rendu de la Session As- sociation Francaise pour l'A- vancement des Sciences. Paris.
C. R. Soc. Biol., Paris.....	Compte Rendu Hebdomadaire des Séances et Mémoires de la Société de Biologie. Paris.
Curr. Sci. ....	Current Science. Bangalore.
Dansk. FishForen. Medl.....	Dansk Fiskeriforenings Med- lemsblad. Copenhagen.

Denkschr. Akad. Wiss., Wien.....	Denkschriften der Kaiserlichen Akademie der Wissenschaften. Wien.
Dokl. Akad. Nauk SSSR.....	Doklady Akademii Nauk SSSR. Moscow.
Doriana .....	Doriana. Genoa.
Dtsch.Fisch.-Korresp. ....	Deutsche Fischerei - Korrespondenz. Cöln.
Dtsch. Fisch.-Ztg. ....	Deutsche Fischerei-Zeitung. Berlin-Friedrichshaven.
Ecology .....	Ecology. Durham, N. C.
Ergebn. allg. Path. path. Anat.....	Ergebnisse der allgemeinen Pathologie u. patholog. Anatomie d. Menschen u.d.Tiere. Wiesbaden.
Experientia .....	Experientia. Revue Mensuelle des Sciences Pures et Appliquées. Basel.
Fauna & Flora, Pretoria.....	Fauna and Flora (Transvaal Provincial Administration). Pretoria.
Fischereztg. Neudamm .....	Fischereizeitung. Neudamm.
Fiskeridir. Skr. Havundersøk.....	Fiskeridirektoratets Skrifter. Serie Havundersøkelser. Bergen.
Fisktdskr. Finl. ....	Fiskeritidskrift för Finland. Helsingfors.
Fischwirt .....	Fischwirt. Hamburg.
Fish Bull., Sacramento.....	Fish Bulletin (California Department of Fish and Game). Sacramento.
Fish. Bull., U.S.....	Fishery Bulletin, U. S. Fish and Wildlife Service. Washington, D. C.
Fish. Gaz., London.....	Fishing Gazette. London
Folia zool. hydrobiol., Riga.....	Folia Zoologica et Hydrobiologica. Riga.
For. & Str.....	Forest and Stream. New York.
Gewäss. u. Abwäss.....	Gewässer und Abwässer. Düsseldorf.

Helgoland. wiss. Meeresunters.....	Helgoländer Wissenschaftliche Meeresuntersuchungen. Stuttgart.
Heredity .....	Heredity. London.
Hokusuishi Jumbo .....	Hokusuishi Jumbo, Yoichi.
Int. Congr. Zool., Monaco.....	International Congress of Zool- ogy. Monaco.
Int. Rev. Hydrobiol.....	Internationale Revue der gesam- ten Hydrobiologie. Berlin.
Invest. Rep. U.S. Bur. Fish.....	Investigational Report. U.S. Bu- reau of Fisheries. Washington, D. C.
Irish Nat. J.....	Irish Naturalists' Journal. Belfast.
J. Anat., London.....	Journal of Anatomy (and Physi- ology). London.
J. Anat., Paris.....	Journal de l'anatomie et de la physiologie normales et patho- logiques de l'homme et des ani- maux. Paris.
J. Asiat. Soc. Beng.....	Journal of the Asiatic Society of Bengal. Calcutta.
J. Bombay nat. Hist. Soc.....	Journal of the Bombay Natural History Society. Bombay.
J. Coll. Agric., Tokyo.....	Journal of the College of Agri- culture, Imperial University of Tokyo. Tokyo.
J. Coll. Sci. Tokyo.....	Journal of the College of Science, Imperial University of Tokyo. Tokyo.
J. Cons. ....	Journal du Conseil. Copenhagen.
J. Elisha Mitchell sci. Soc.....	Journal of the Elisha Mitchell Scientific Society. Chapel Hill, N. C.
J. exp. Zool.....	Journal of Experimental Zoolo- gy. Philadelphia.
J. Fac. Sci. Hokkaido.....	Journal of the Faculty of Science. Hokkaido University. Hokkaido.



J. Fac. Sci. Univ. Tokyo.....	Journal of the Faculty of Science. University of Tokyo. Tokyo.
J. Fish. Res. Bd. Can.....	Journal of the Fisheries Research Board of Canada. Ottawa.
J. Hered. ....	Journal of Heredity. Baltimore.
J. Linn. Soc. (Zool.).....	Journal of the Linnean Society (Zoology). London.
J. Mar. biol. Ass. India.....	Journal of the Marine Biological Association of India. Mandapam Camp.
J. Mar. biol. Ass. U.K.....	Journal of the Marine Biological Association of the United Kingdom. Plymouth.
J. Morph. ....	Journal of Morphology. Philadelphia.
J. Path. Bact.....	Journal of Pathology and Bacteriology. London.
J. R. micr. Soc.....	Journal of the Royal Microscopical Society. London.
J. Sci. Hiroshima Univ.....	Journal of Science of the Hiroshima University. Hiroshima.
J. Tenn. Acad. Sci.....	Journal of the Tennessee Academy of Science. Nashville.
J. Univ. Bombay.....	Journal of the University of Bombay. Fort Bombay.
J. zool. Soc. India.....	Journal of the Zoological Society of India. Calcutta.
Jap. J. Ichthyol.....	Japanese Journal of Ichthyology. Tokyo.
Jber. Ver. naturk. Mannheim.....	Jahresbericht des vereins für Naturkunde in Mannheim.
Jh. Ver. vaterl. Naturk. Württemb....	Jahresheft des Vereins für Väterländische Naturkunde in Württemberg. Stuttgart.
Kagaku .....	Kagaku, Tokyo.
Kieler Meeresforsch .....	Kieler Meeresforschungen. Kiel.

K. norske vidensk. Selsk. Forh.....	Kongelige Norske Videnskabernes Selskabs Forhandling. Trondheim.
KorrespBl. NaturfVer. Riga.....	Korrespondenzblatt des Naturforschervereins zu Riga.
Kosmos, Lwów.....	Kosmos. Czasopismo Polskiego Towarzystwa przyrodników imienia Kopernika. Lwów.
Maryland Nat. ....	Maryland Naturalist. Baltimore.
Math.-fys. Medd. ....	Mathematisk-fysiske Meddelelser. Kgl. Danske Videnskabernes Selskab. Copenhagen.
Medd. Soc. Fauna Fl. Fenn.....	Meddelanden af Societas pro Fauna et Flora Fennica. Helsingfors.
Mém. Acad. Sci. St-Pétersb.....	Mémoires de l'Académie Impériale des sciences de St-Pétersbourg.
Mem. Amer. Acad. Arts. Sci.....	Memoirs of the American Academy of Arts and Sciences. Boston.
Mem. Com. talassogr. ital.....	Memorie del Comitato Talassografico Italiano. Venezia.
Mem. R. Accad. Bologna.....	Memorie della R. Accademie delle scienze dell' Institute di Bologna. Bologna.
Mem. R. Ist. veneto.....	Memorie del R. Istituto veneto di scienze, lettere ed arti. Venezia.
Mém. Soc. linn. Normandie.....	Mémoires de la Société linnéenne de Normandie. Caen.
Mem. Soc. zool. tchéosl.....	Vestník Československé Zoologické Společnosti. Prague.
Memor. Soc. Fauna Fl. fenn.....	Memoranda Societatis pro Fauna et Flora Fennica. Helsinki.
Misc. Publ. Mus. Zool. Univ. Mich....	Miscellaneous Publications of the Museum of Zoology, University of Michigan.
Mitt. hamburg. zool. Mus.....	Mitteilungen aus den Hamburgischen Zoologischen Museum und Institut. Hamburg.

Mitt. Mus. Naturk. Magdeb.....	Mitteilungen aus dem Museum für Naturkunde und Vergeschichte und dem naturwissenschaftlichen Arbeitskreis. Magdeburg.
Mitt. westpreuss. FischVer.....	Mitteilungen des Westpreussischen Fischereivereins. Danzig.
Mitt. zool. Sta. Neapel.....	Mitteilungen aus der Zoologischen Station zu Neapel. Berlin.
Mon. Publ. Shimane Pref. Fish. Exp. Sta.....	Shimane Suishi Geppo, Hamada.
Monit. zool. ital.....	Monitore Zoologico Italiano. Firenze.
Morph. Jb. ....	Morphologisches Jahrbuch. Leipzig.
N.Z.J. Sci. Tech.....	New Zealand Journal of Science and Technology. Wellington.
Nachr. naturw. Mus. Aschaffenburg..	Nachrichten des Naturwissenschaftlichen Museums der Stadt Aschaffenburg.
Nasha Okh. ....	Nasha Okhota. Petrograd.
Nat. Hist. Mag.....	Natural History Magazine. British Museum. London.
Nat. Hist., N. Y.....	Natural History. New York.
Nat. malgache .....	Naturaliste Malgache. Tananarive.
Natur. u. Volk.....	Natur und Volk. Senckenbergische Naturforschende Gesellschaft. Frankfurt.
Natura, Milano .....	Natura. Milano.
Nature, Lond. ....	Nature. London.
Nature Mag. ....	Nature Magazine. Baltimore.
Nature, Paris .....	Nature. Paris.
Naturen .....	Naturen. Bergen.
Natuurk. Tijdschr. Ned.-Ind.....	Natuurkundig tijdschrift voor Nederlandsch-Indie. Batavia.

Neptunia .....	Neptunia. Revue de l'Association des Amis du Musée de la Marine. Paris.
Nerthus .....	Nerthus. Wochenschrift für Pflanzen und Blumenfreunde. Altona.
Nihon Gakujutsu Kyokai Hokoku...	Nihon Gakujutsu Kyokai Hokoku, Tokyo.
Notes Inst. océanogr. Split.....	Notes. Institute of Oceanography and Fisheries. Split.
Notes Leyden Mus.....	Notes, Leden Museum. Leyden.
Nova Acta Leop. Carol.....	Nova Acta Academiae Caesareae Leopoldino-Carolinae Germanicae naturae curiosorum. Halle.
Ofvers. finska VetenskSoc. Förh....	Ofversigt af Finska Vetenskaps-societetens Förhandlingar. Helsingfors.
Okólnik Ryb.....	Okólnik Rybacki. Organ Krajowego Towarzystwa Rybackiego w Krakowie.
Öst. FischZtg.....	Österreichische Fischereizeitung. Wien.
Overs. dansk Vidensk. Selsk.....	Oversigt over det Kgl. Danske Videnskabernes Selskabs Förhandlingar. Copenhagen.
Pacific Discov. ....	Pacific Discovery. Berkeley, Calif.
Paläont. Z.....	Paläontologische Zeitschrift. Berlin.
Pap. Mich. Acad. Sci.....	Papers from the Michigan Academy of Science, Arts and Letters. Ann Arbor.
Pap. roy. Soc. Tasm.....	Papers and Proceedings of the Royal Society of Tasmania. Hobart.
Peking nat. Hist. Bull.....	Peking Natural History Bulletin, Yen-Ching University. Peking.
Phil. Trans.(B) .....	Philosophical Transactions of the Royal Society. Series B. Biological Sciences. London.

Physiol. Zoöl.....	Physiological Zoölogy. Chicago.
Proc. Acad. nat. Sci. Philad.....	Proceedings of the Academy of Natural Sciences of Philadelphia.
Proc. Bghm. nat. Hist. Soc.....	Proceedings of the Birmingham Natural History and Philosophical Society. Birmingham.
Proc. Boston Soc. nat. Hist.....	Proceedings of the Boston Society of Natural History. Boston.
Proc. Camb. phil. Soc.....	Proceedings of the Cambridge Philosophical Society. Cambridge.
Proc. Ind. Acad. Sci.....	Proceedings of the Indiana Academy of Sciences. Brookville.
Proc. Indian Acad. Sci.(B).....	Proceedings of the Indian Academy of Sciences. Series B. Biological Sciences. Bangalore.
Proc. Iowa Acad. Sci.....	Proceedings of the Iowa Academy of Science. Des Moines.
Proc. La. Acad. Sci.....	Proceedings of the Louisiana Academy of Sciences. Baton Rouge.
Proc. Linn. Soc. London.....	Proceedings of the Linnean Society. London.
Proc. Linn. Soc. N.S.W.....	Proceedings of the Linnean Society of New South Wales. Sydney.
Proc. Lpool. biol. Soc.....	Proceedings and Transactions of the Liverpool Biological Society. Liverpool.
Proc. nat. Inst. Sci. India.....	Proceedings of the National Institute of Sciences of India. Calcutta.
Proc. Pan-Pacific sci. Congr., Tokyo	Proceedings of the Pan-Pacific Science Congress. Tokyo.
Proc. R. phys. Soc. Edinb.....	Proceedings of the Royal Physical Society of Edinburgh.
Proc. R. Soc. Med.....	Proceedings of the Royal Society of Medicine. London.

Proc. R. zool. Soc. N.S.W.....	Proceedings of the Royal Zoological Society of New South Wales. Sydney.
Proc. roy. Soc. (B).....	Proceedings of the Royal Society. Series B. Biological Sciences. London.
Proc. roy. Soc. Edinb.(B).....	Proceedings of the Royal Society of Edinburgh. Section B.-Biology.
Proc. U.S. nat. Mus.....	Proceedings of the United States National Museum. Washington, D. C.
Proc. zool. Soc. Lond.....	Proceedings of the Zoological Society of London.
Progr. Fish Cult.....	Progressive Fish Culturist. Washington, D. C.
Publ. Inst. Biol. apl. Barcelona.....	Publicaciones del Institute de Biología Aplicada. Barcelona.
Publ. Inst. Mar. Sci. Univ. Texas....	Publications of the Institute of Marine Science. University of Texas. Port Aransas, Texas.
Puntal .....	Puntal. Revista Maritima y Pesquera. Alicante.
P. V. Soc. linn. Bordeaux.....	Procès-verbaux de la Société linnéenne de Bordeaux.
P. V. Soc. Sci. phys. nat. Bordeaux....	Procès-verbaux des séances de la Société des sciences physiques et naturelles de Bordeaux.
R. C. Accad. Napoli.....	Rendiconti della R. Accademia delle Scienze Fisiche e Matematiche. Naples.
R. C. Ist. lombardo.....	Rendiconti dell' Istitute lombardo di scienze e lettere. Milano.
Rapp. Cons. Explor. Mer.....	Rapport et Procès-verbaux des Réunions. Conseil Permanent International pour l'Exploration de la Mer. Charlottenlund.
Rec. Indian Mus.....	Records of the Indian Museum. Calcutta.
Rep. Akita Pref. Fish. Exper. Sta....	Akita-Ken Suisan Shikenjo Jigyo Hokoku-Sho, Funakawa.

Rep. Brit. Ass.....	Report of the British Association for the Advancement of Science. London.
Rep. Fish. Bd. Scot.....	Report of the Fishery Board for Scotland. Edinburgh.
Rep. Fish. Can.....	Report of the Fisheries Branch, Department of Marine and Fisheries, Canada. Ottawa.
Rep. Fish. Mar. biol. Surv. S. Afr....	Report of the Fisheries and Marine Biological Survey, Republic of South Africa. Pretoria.
Rep. For. Comm. N.Y.....	Report of the Forest, Fish and Game Commissioner, New York State. Albany.
Rep. Inst. Freshw. Res. Drottning....	Report of the Institute of Freshwater Research, Fishery Board of Sweden. Drottningholm.
Rep. Lancs. Sea-Fish. Lab.....	Report of the Lancashire Sea-Fisheries Laboratories. Liverpool.
Rep. Northumb. Sea Fish. Comm....	Report of the Scientific Investigations. (Northumberland Sea Fisheries Committee). Newcastle-upon-Tyne.
Rep. Plymouth Instn.....	Report and Transactions of the Plymouth Institution and Devon and Cornwall Natural History Society. Plymouth.
Rep. prov. Mus. nat. Hist. B.C.....	Report. Provincial Museum of Natural History and Anthropology, British Columbia. Victoria.
Rep. U.S. Comm. Fish.....	Report of the United States Commissioner of Fisheries. Washington, D. C.
Rev. bras. Biol.....	Revista Brasileira de Biologia. Rio de Janeiro.
Rev. Fac. Ciênc. Lisboa (C).....	Revista da Faculdade de Ciências. Universidade de Lisboa. Serie C.-Ciências Naturais. Lisbon.
Rev. suisse Zool.....	Revue Suisse de Zoologie. Annales de la Société Zoologique Suisse et du Muséum d'Histoire Naturelle de Geneve. Geneva.



Riv. Biol. gen.....	Rivista di biologia generale. Torino.
Riv. ital. Sci. nat.....	Rivista Italiana di Scienze Na- turali. Siena.
Riv. mens. Pesca.....	Rivista mensile di pesca e idro- biologia. Como.
Roux Arch. EntwMech. Org.....	Wilhelm Roux Archiv für Ent- wicklungsmechanik der Organ- ismen. Berlin.
Russk. gidrobiol. Zh.....	Russische hydrobiologische Zeit- schrift. Saratov.
Salm. Fish. ....	Salmon Fisheries. Fishery Board for Scotland. Edinburgh.
S. B. Akad. Wiss. Wien.....	Sitzungsberichte der Akademie der Wissenschaften in Wien.
S. B. dtsh. Akad. Wiss.....	Sitzungsberichte der Deutschen Akademie der Wissenschaften zu Berlin.
S. B. Ges. ges. Naturw. Marburg.....	Sitzungsberichte der Gesell- schaft zur Beförderung der Ge- samten Naturwissenschaften zur Marburg.
S. B. Ges. Morph. Physiol. Münch.....	Sitzungsberichte der Gesell- schaft für Morphologie und Physiologie in München.
S. B. Ges. naturf. Fr. Berl.....	Sitzungsberichte der Gesell- schaft Naturforschender Freun- de zu Berlin.
S. B. 'Lotos'.....	Sitzungsberichte des Deutschen Naturwissenschaftlich - medicin- ischen Vereins für Böhmen 'Lo- tos' in Prag. Prague.
S. B. naturf. Ges. Lpz.....	Sitzungsberichte der Naturfor- schenden Gesellschaft zu Leip- zig.
Sborn. Rab. Ikhtiol. Gidrobiol.....	Sbornik Rabot na Ikhtiologii i Gidrobiologii.
Schweiz. FischZtg. ....	Schweizerische Fischereizeitung. Phäffikon.
Sci. & Cult.....	Science and Culture. Calcutta.
Sci. Gossip .....	Science Gossip. London.
Sci. Mon., N.Y.....	Scientific Monthly. New York.
Sci. Obsr., Boston.....	Science Observer. Boston.

Sci. Rep. Hokkaido Salm. Hatch.....	Scientific Reports of the Hokkaido Salmon Hatchery. Nakanoshima.
Sci. Rep. nat. Tsing Hua Univ.....	Science Reports of the National Tsing Hua University. Peiping.
Science .....	Science (American Association for the Advancement of Science). Washington, D. C.
Science, Tokyo .....	Science, Tokyo
Sea Frontiers .....	Sea Frontiers. Magazine of the International Oceanographic Foundation. Coral Gables, Fla.
Sinensia .....	Sinensia. Contributions from the Metropolitan Museum of Natural History. Shanghai.
Sthwest. Nat. ....	Southwestern Naturalist.
Student & Intel. Observer.....	Student and Intellectual Observer. London.
Suisan Gakkwai Ho.....	Suisan Gakkwai Ho, Tokyo.
Suisan Gaku Zasshi.....	Suisan Gaku Zasshi, Sapporo and Hakodate.
Suisan Kenkyu-Shi .....	Suisan Kenkyu-Shi, Tokyo.
Svensk. Fisk-Tidskr. ....	Svensk Fiskeritidskrift. Stockholm.
Term-Tud. Közl.....	Természettudományi Közlöny. Budapest.
Thalassia jon. ....	Thalassia Jonica. (Istituto Sperimentale Talassografico di Taranto.) Taranto.
Trans. Amer. Fish. Soc.....	Transactions of the American Fisheries Society. St. Paul, Minn.
Trans. Dumfr. Gall. nat. Hist. Soc. ....	Transactions and Journal of the Proceedings of the Dumfriesshire and Galloway Natural History and Antiquarian Society. Edinburgh.
Trans. Ill. Acad. Sci.....	Transactions of the Illinois State Academy of Sciences. Springfield
Trans. Kans. Acad. Sci.....	Transactions of the Kansas Academy of Science. Topeka.
Trans. Ky. Acad. Sci.....	Transactions of the Kentucky Academy of Science. Lexington.

Trans. Linn. Soc. Lond. (Zool.).....	Transactions of the Linnean Society of London. (Zoology).
Trans. path. Soc. Lond.....	Transactions of the Pathological Society of London.
Trans. Proc. N.Z. Inst.....	Transactions and Proceedings of the New Zealand Institute. Wellington.
Trans. roy. Soc. Can. (V).....	Transactions of the Royal Society of Canada. Section V.-Biological Sciences. Ottawa.
Trans. Wis. Acad. Sci. Arts Lett....	Transactions of the Wisconsin Academy of Sciences, Arts and Letters. Madison, Wis.
Trans. zool. Soc. Lond.....	Transactions of the Zoological Society of London.
Trav. Inst. sci. chérif.....	Travaux. Institut Scientifique Chérifien. Tanger.
Trav. Inst. zool. Acad. Sci. URSS....	Travaux de l'Institut zoologique de l'Académie des sciences de l'URSS. Leningrad.
Trav. Lab. Soc. sci. Arcachon.....	Travaux des laboratoires de la Société scientifique et Station zoologique d'Arcachon. Bordeaux.
Trav. sci. Univ. Rennes.....	Travaux scientifiques de l'Université de Rennes.
Trav. Soc. Nat., St-Petersb.....	Travaux de la Société Impériale des naturalistes de St-Petersbourg.
Turttox News .....	Turttox News. Chicago.
Univ. Wash. Publ. Fish.....	University of Washington Publications-Fisheries. Seattle, Wash.
Verh. dtsch. zool. Ges.....	Verhandlungen der Deutschen Zoologischen Gesellschaft. Leipzig.
Verh. phys.-med. Ges. Würzb.....	Verhandlungen der Physikalisch-medizinischen Gesellschaft zu Würzburg.
Verh. schweiz. naturf. Ges.....	Verhandlungen der Schweizerischen Naturforschenden Gesellschaft. Aarau.
Verh. zool.-bot. Ges. Wien.....	Verhandlungen der Zoologisch-botanischen Gesellschaft. Wien.

Versl. gewone Vergad. Akad. Amst.	Verslagen van de gewone vergadering der Wis-en natuurkundige afdeeling. Konink Akademie van wetenschappen te Amsterdam.
Věstn. čsl. Spol. zool.	Věstník Československé Společnosti Zoologické. Prague.
Vict. Nat.	Victorian Naturalist. Melbourne.
Vidensk. Medd. dansk naturh. Foren. Kbh.	Videnskabelige Meddelelser fra Dansk Naturhistorisk Forening i København.
Virchows Arch.	Virchows Archiv für pathologische Anatomie und physiologie für klinische Medizin. Berlin.
Vop. Ikhtiol.	Voprosy Ikhtiologii. Moscow.
Wiss. Meeresuntersuch.	Wissenschaftliche Meeresuntersuchungen der Kommission zur Wissenschaftlichen Untersuchung der Deutschen Meere. Kiel and Leipzig.
Wiss. Z. Martin-Luther-Univ. math.-nat.	Wissenschaftliche Zeitschrift der Martin-Luther-Universität Halle - Wittenberg. Mathematisch-Naturwissenschaftliche Reihe. Halle.
Wschr. Aquar.-u. Terrarienk.	Wochenschrift für Aquarien-und Terrarienkunde. Braunschweig.
Yoshoku-Kaishi	Yoshoku-Kaishi, Tokyo.
Z. Fisch.	Zeitschrift für Fischerei und deren Hilfswissenschaften. Berlin.
Z. Morph. Ökol. Tiere	Zeitschrift für Morphologie und Ökologie der Tiere. Berlin.
Z. Naturf. (B)	Zeitschrift für Naturforschung. Tiel B.-Chemie, Biochemie, Biophysik, Biologie und Verwandte Gebiete. Wiesbaden.
Z. Tierpsychol.	Zeitschrift für Tierpsychologie. Berlin.
Z. wiss. Zool.	Zeitschrift für Wissenschaftliche Zoologie. Leipzig.
Zool. Anz.	Zoologischer Anzeiger. Leipzig.
Zool. Gart., Frankfurt	Zoologische Garten. Frankfurt.
Zool. Gart., Lpz.	Zoologische Garten. Leipzig.

Zool. Jb. Anat.....	Zoologische Jahrbücher. Abteilung für Anatomie und Ontogenie der Tiere. Jena.
Zool. Mag., Tokyo.....	Zoological Magazine. Tokyo.
Zoologica, N.Y. ....	Zoologica. Scientific Contributions of the New York Zoological Society.
Zoologist .....	Zoologist. London.